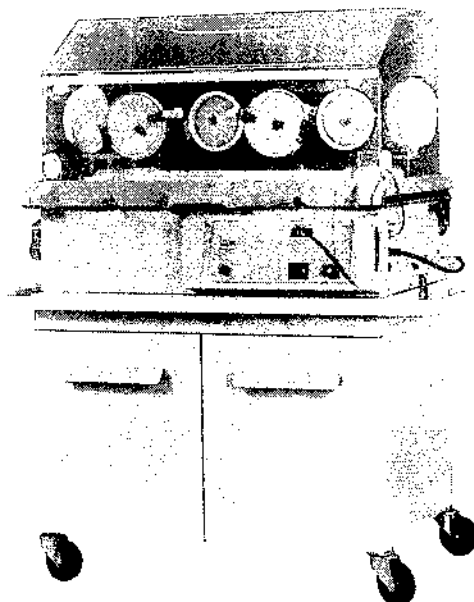
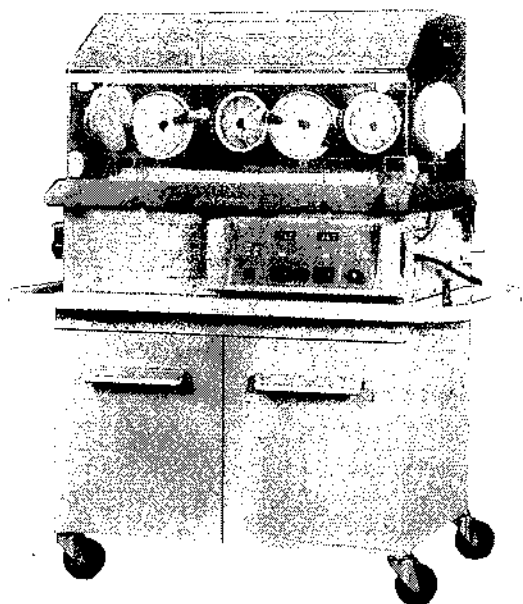


ISOLETTE®
INFANT INCUBATOR
MODELS C100-2 AND 2E
C200-1 AND 1E



OPERATOR'S MANUAL



AIR-SHIELDS
A HEALTHDYNE COMPANY

OPERATING PRECAUTIONS

GENERAL PRECAUTIONS

- Incubator misuse may result in harm to an infant. Incubators should be used only by properly trained personnel as directed by an appropriately qualified attending physician aware of currently known hazards and benefits.
- The Incubator should not be used if it fails to function properly. Service should be referred to qualified personnel.
- Mattress temperature may rise above preset level if Access Panel is left open. Therefore, do not leave open longer than essential. Do not rely on temperature indicator when Access Panel is open.
- For infant safety DO NOT leave the infant unattended when the Access Panel is open.
- When the Access Panel is open, a curtain of warm air flows from beneath the front edge of the mattress toward the top of the Access Panel opening. The temperature of this air shield is higher than the typical Incubator air temperature, therefore the infant should be kept clear of this warm air path.
- The Incubator must be attached to the Cabinet Stand using the clamps provided. Failure to do so could result in the Incubator separating from the stand if sufficiently tilted, particularly with the hood open.
- The air curtain must be properly installed for correct temperature control.
- To avoid overheating the infant due to direct radiation, do not position the Incubator in direct sunlight or under other sources of radiant heat. The high air temperature alarm might not be actuated under these conditions.
- Phototherapy units located too close to the Incubator may affect hood wall temperature, Incubator air temperature and infant skin temperature.
- When an x-ray is taken through the hood, the hole in the top of the hood used with the optional weighing scale could show up on the x-ray as a radiolucent shadow and could result in incorrect diagnosis.
- To prevent harm to the infant, the Hood should not be raised while leads or tubing are connected to the infant. There should be no need to raise the hood at any time while the infant is cared for in the Incubator. All necessary access to the infant can be achieved by means of the Access Panel and Access Doors.
- The use of infant seats, head hoods or other accessories within the Incubator which can alter the air flow pattern may affect temperature uniformity, temperature variability, the correlation of the Incubator temperature reading to center mattress temperature and infant skin temperature.

ELECTRICAL PRECAUTIONS

- To ensure grounding reliability, connect the AC Power Cord only to a properly grounded 3-wire hospital grade or hospital use outlet. Do not use extension cords. If any doubt exists as to the grounding connection, do not operate the equipment.
- An electric shock hazard exists within the Controller when the cover is removed. Servicing should be performed only by qualified personnel.

OPERATING PRECAUTIONS (CONTINUED)

EXPLOSION PRECAUTIONS

- Do not use in the presence of flammable anesthetics.
- Make sure that the oxygen supply to the Incubator is turned off and that the Incubator is disconnected from the oxygen supply when performing cleaning and maintenance procedures; a fire and explosion hazard exists when performing cleaning and/or maintenance procedures in an oxygen enriched environment.

OXYGEN PRECAUTIONS

- Improper use of supplemental oxygen may be associated with serious side effects including blindness, brain damage, and death. The risks vary with each infant. The method, the concentration, and the duration of oxygen administration should be prescribed by the attending physician.
- If it is necessary to administer oxygen in an emergency, the attending physician should be notified immediately.

NOTE: See current edition of "Guidelines for Perinatal Care" of the American Academy of Pediatrics/The American College of Obstetricians and Gynecologists.

- The oxygen concentration inspired by an infant does not predictably determine the partial pressure of oxygen (pO_2) in the blood. When deemed advisable by the attending physician, blood pO_2 should be measured by accepted clinical techniques.
- Oxygen flow rates cannot be used as an accurate indication of oxygen concentrations in an Incubator. Oxygen concentrations should be measured with a calibrated oxygen analyzer at intervals directed by the attending physician.
- The use of the Vapojet[®] Humidifier (accessory) or other means of external humidification will alter predicted incubator oxygen concentrations.
- A dirty air intake filter may affect oxygen concentrations or cause carbon dioxide buildup.
- Keep matches, lighted cigarettes, and all other sources of ignition out of the room in which the Incubator is located. Textiles, oils, and other combustibles are easily ignited and burn with great intensity in air enriched with oxygen.

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TABLE OF DEFINITIONS AND SYMBOLS

TECHNICAL DEFINITIONS

Control Zone. Between two planes 10 and 15 cm above the mattress center and parallel to the mattress, measurement points being above the center points of the four quadrants of the mattress.

Incubator Temperature. Air temperature at a point 10 cm (4 in.) above and centered over the mattress surface.

Temperature Equilibrium. The condition reached when the average **Incubator Temperature** does not vary more than 0.2°C over a period of one hour.

Temperature Overshoot. The amount by which **Incubator Temperature** exceeds average **Incubator Temperature** at **Temperature Equilibrium**, resulting from a change in control temperature.

Temperature Rise Time. The time required for the **Incubator Temperature** to rise 10°C.

Temperature Uniformity. The amount by which the average temperature at each of four points 10 cm (4 in.) above the mattress surface differs from the average **Incubator Temperature at Temperature Equilibrium**. The four points are the centers of four areas formed by lines that divide the width and length of the mattress surface.

Temperature Variability. The variability of the temperature at a fixed point in the incubator above the mattress that will be observed over a one-hour period after **Temperature Equilibrium** has been reached and all accesses remain closed.

NOTE, IMPORTANT, CAUTION AND WARNING

NOTE. A Note is inserted in text to point out procedures or conditions which may otherwise be misinterpreted or overlooked. A Note may also be used to clarify apparently contradictory or confusing situations.

IMPORTANT. Similar to a Note but used where greater emphasis is required.

CAUTION. A Caution is inserted in text to call attention to a procedure which, if not followed exactly, can lead to damage or destruction of the equipment.

WARNING. A Warning is inserted in text to call attention to dangerous or hazardous conditions inherent to the operation, cleaning, and maintenance of the equipment which may result in personal injury or death of the operator or patient.

SYMBOLS



Attention; consult accompanying documents.



Type B equipment with an F-type isolated (floating) applied part.



Protective earth (ground).

SECTION 1

GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides instructions for installation, use, operator maintenance, and troubleshooting of the Air-Shields ISOLETTE® Infant Incubators, Models C100 and C200. Air-Shields cannot be responsible for the performance of the Incubator if the user does not operate the unit in accordance with the instructions, fails to follow the maintenance recommendations in Section 5 of this manual or effects any repairs with unauthorized components. Calibration and repair should be performed only by qualified service personnel. Technical information is available through your local distributor.

This manual should be read, thoroughly understood, and readily accessible to all personnel who will be working with the unit. The manual should be stored on the shelf in the cabinet stand when not in use. If there is anything you do not understand, please contact your Air-Shields representative for further information.

1.2 DESCRIPTION

The forced air circulation system of the Incubator permits stable temperature control, uniform heat distribution, humidification, effective isolation of the infant from airborne contaminants, and control of oxygen concentrations. Accessibility to the infant is provided by an Access Panel, Access Doors, and Iris Entry Ports. When the Access panel is open, a curtain of warm air flows from beneath the front edge of the mattress toward the top of

the Access Panel opening; this air shield minimizes the temperature drop within the hood environment. The Incubator is designed for use in a nursery environment having a typical ambient operating temperature range of 22 to 28° C. A guard rail is standard on all units.

On the Model C100, Skin or Air Temperature Control is selected by a front panel control. The Model C200 is equipped only for Air Temperature Control. Instrumentation includes digital display for temperature, relative indication of heater output, and a comprehensive visual and audible alarm system which includes an alarm test feature.

1.3 SPECIFICATIONS

Specifications for the Incubators are provided in Table 1.1. All specifications are subject to change without notice. The use of infant seats, head hoods or other accessories within the Incubator which can alter the air flow pattern may affect temperature uniformity, temperature variability, the correlation of the Incubator temperature reading to center mattress temperature and infant skin temperature.

1.4 ACCESSORIES

Accessories available for use with the Incubators are illustrated in Figure 1.1. Refer to Section 6 of this manual for part numbers.

TABLE 1.1 SPECIFICATIONS

Power Requirements:

Model C100-2	110/120V ~, 50/60 Hz, 350W
Model C100-2E	220/240V ~, 50/60 Hz, 350W
Model C200-1	100V ~, 50/60 Hz, 350W
Model C200-1E	110/120V ~, 50/60 Hz, 350W
.....	220/240V ~, 50/60 Hz, 350W
.....	100V ~, 50/60 Hz, 350W

Chassis Leakage Current 100µA or less.

Alarms:

Air Flow	Actuated by fan failure or a short-circuited Air Flow probe.
Probe	Actuated by a defective Air, Skin* High Temperature or Auxiliary probe or if the Skin* Temperature probe is disconnected when operating in Skin* Mode. Also actuated by an open-circuited Air Flow probe when the temperature sensed below deck is greater than 30° to 31° C.
High Temperature	Actuates if Air Temperature sensed below deck rises above 39.5 ± 0.5° C.
Set Temperature (SET TEMP)	Actuates if Skin* or Air Temperature fluctuates from set temperature as follows: In Skin Mode-Skin Temperature + 1.0 ± 0.3° C -1.0 ± 0.3° C In Air Mode-Air Temperature + 1.5 ± 0.5° C -3.0 ± 0.5° C

*Model C100 only.

TABLE 1.1 SPECIFICATIONS (CONTINUED)

Alarms (cont):

Power Failure Alarm (POWER FAIL) An alarm which is actuated if primary power to the incubator fails or the power cord is accidentally disconnected from the wall receptacle.

Alarm Silence/Reset Switch

Silence Silences the set temp audible alarm for 12 to 15 minutes; alarm silence is automatically over-ridden if a subsequent alarm occurs within the period of silence.

Reset Cancels High Air Temp, Air Flow or Probe Alarm if alarm condition no longer exists.

Temperature Control Ranges:

Air Temperature Mode 20.0 to 38.4 \pm 0.4°C.

Skin Temperature Mode* 34.0 to 37.9°C.

Temperature Rise Time** <45 minutes.

Temperature Variability** 0.2°C.

Temperature Overshoot** 0.5°C maximum.

Temperature Uniformity** 1°C.

Correlation of Indicated Air Temperature to Actual Incubator Temperature**

(after Temperature Equilibrium** is reached) \pm 1°C.

Correlation of Indicated Temperature to Set Temp

(after Temperature Equilibrium** is reached):

Air \pm 0.5°C of set temperature up to 38.5°C.

Skin* \pm 0.3°C of set temperature up to 37.9°C.

Oxygen Concentration Range 20.9 to >70%.

Humidity Typically between 50 and 60% with water in humidity reservoir.

Nominal Dimensions:

Height 134 cm (52-3/4")

Depth 56 cm (22")

Width 116 cm (45.7")

Nominal Weight 76 Kg (168 lbs.)

Noise Level Within Hood

Environment 60dBA maximum with 50dBA or less ambient

Air Velocity Over Mattress Does not exceed 10 cm/sec (20 ft/min.) within Control Zone.**

*Model C100 only.

**Refer to Table of Definitions and Symbols.

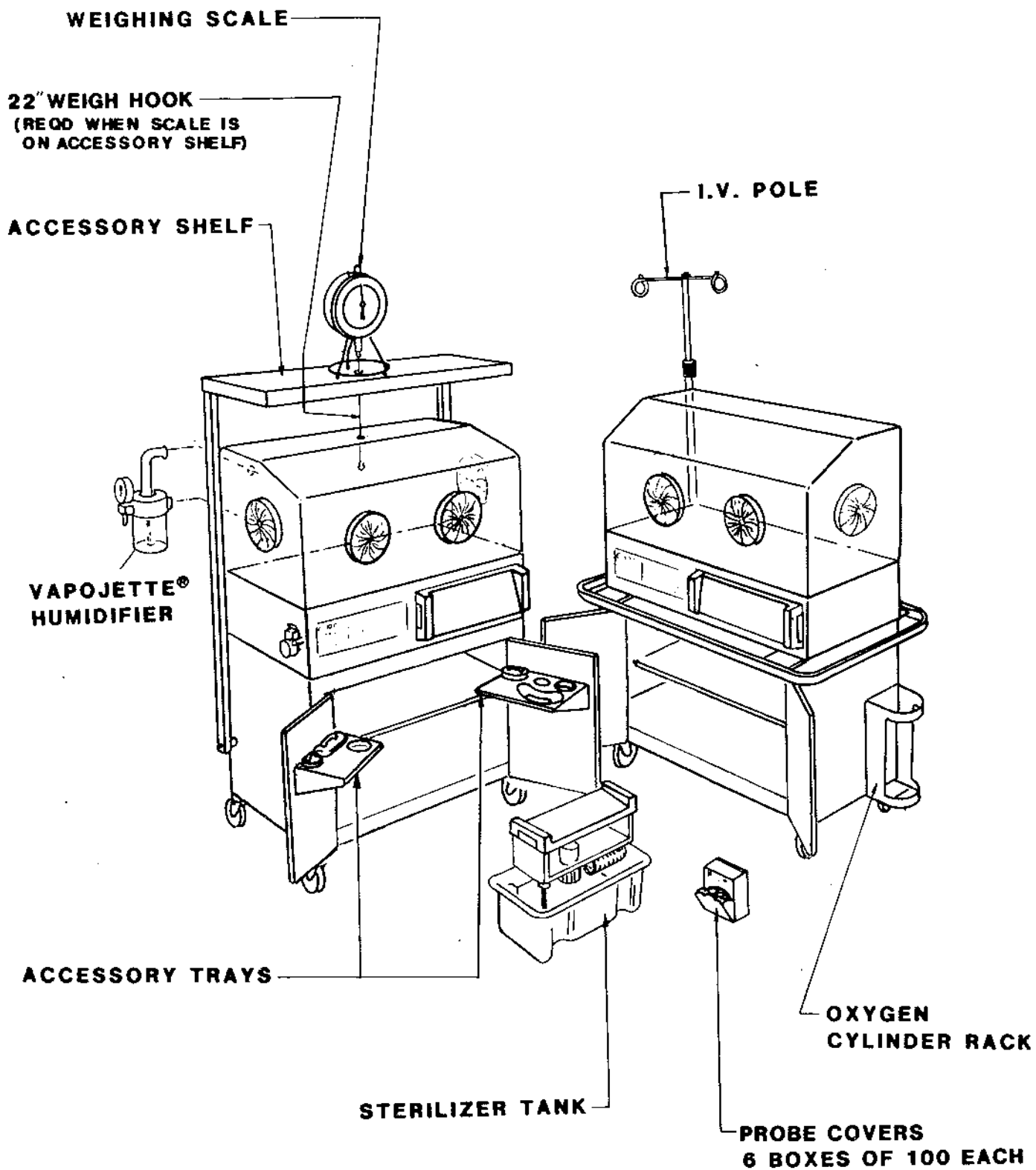


FIGURE 1.1 ACCESSORIES

SECTION 2 INSTALLATION

2.1 UNPACKING

Typically, the Cabinet Stand, the Hood and Base Assembly, and the Guard Rail are shipped in separate cartons. When removing the equipment from the cartons, take care not to scratch or otherwise damage unprotected surfaces. Remove all packing materials from the shell assembly.

2.2 ASSEMBLY

Instructions for assembling the Incubator are provided below

- A. Attach the Guard Rail to the underside of the Base Assembly using the 6 bolts and lock nuts supplied (see Figure 2.1).



CAUTION: Refer to Figure 2.1 for lifting instructions.

- B. Place the Guard Rail and Base Assembly on the Cabinet Stand as shown in Figure 2.1.

WARNING: The Incubator must be attached to the Cabinet Stand using the clamps provided. Failure to do so could result in the Incubator separating from the stand if sufficiently tilted, particularly with the hood open.

- C. Secure the Base Assembly to the Cabinet Stand using the clamp on each side of the Cabinet Stand. Clamps may be adjusted by turning the threaded latch into the body of the clamp.
- D. Install the Hood Assembly on the Base Assembly as shown in Figure 2.1.
- E. Assemble the power cord bracket onto the Base Base Assembly as shown in Figure 2.1.

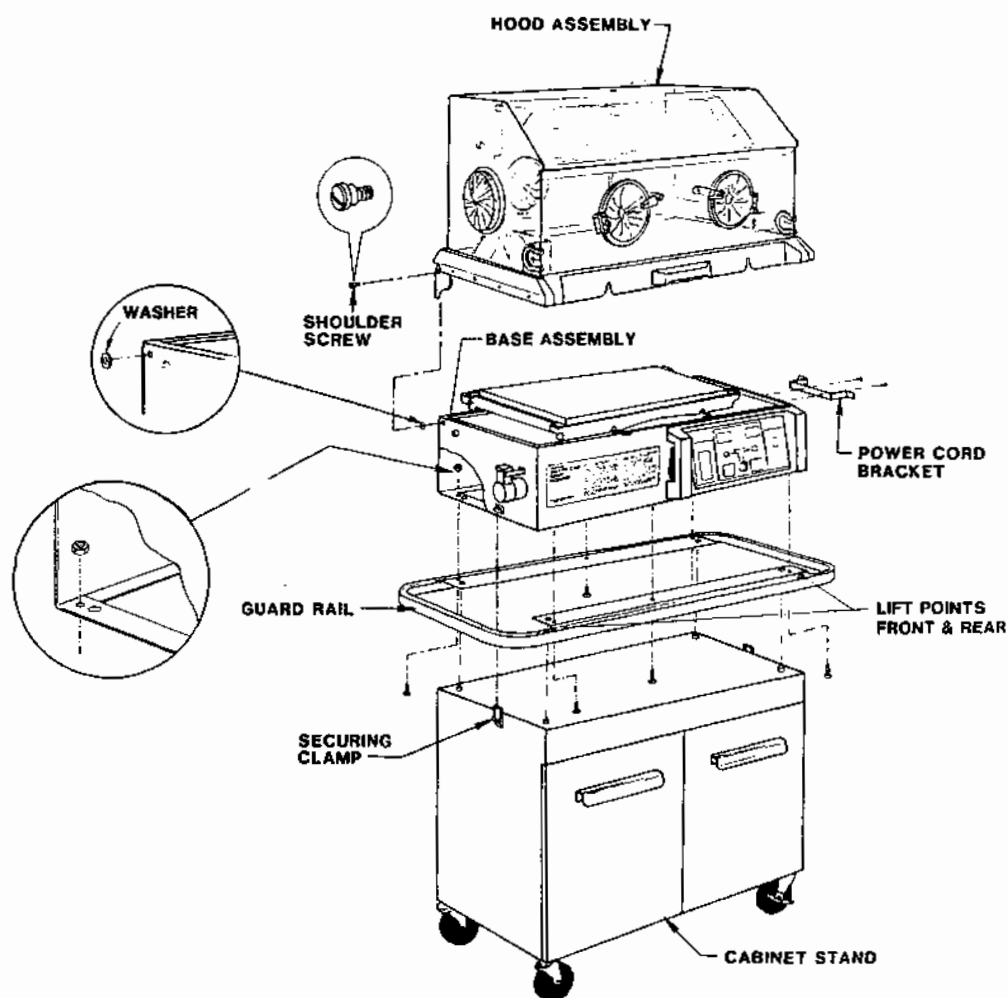


FIGURE 2.1 ASSEMBLY

SECTION 3

FUNCTIONAL DESCRIPTION

3.1 GENERAL

This section provides a general description of the Incubator.

3.2 FUNCTIONAL DESCRIPTION

3.2.1 OVERALL

The control of temperature, humidity, and oxygen concentration is achieved by means of the forced air circulation system as shown in Figure 3.1. A controlled amount of room air (approximately 35 lpm) is drawn through the air/oxygen intake filter by means of the motor driven impeller on the controller. Supplemental oxygen, which is introduced through the Oxygen Input Valve on the filter cover, displaces a portion of room air to maintain the total gas intake (including oxygen) at 35 lpm. Since the amount of room air is controlled by the impeller/filter characteristics and the amount of oxygen is controlled by the flowmeter setting, predictable oxygen concentration within the incubator can be attained. When oxygen flow exceeds 8 lpm, a valve within the oxygen inlet housing is activated to restrict air intake so that higher oxygen concentrations can be achieved without excessive oxygen flow. At 12 lpm maximum air intake restriction is achieved.

In addition to drawing fresh, filtered air into the Incubator, the impeller provides for the internal recirculation at a much greater flow than that of the fresh gas inflow. The total flow of fresh plus recirculated air is directed past the air flow sensor and around the heater with a predetermined portion being directed over the humidity reservoir for humidification. When the Access Panel of the Hood is closed, the Air Curtain Cover is closed and all the air enters the infant compartment up through the slot at the right end of the main deck as shown in Figure 3.1. After circulating within the infant compartment, the air is then recirculated down through the slot in the left end of the main deck, past the temperature sensing probe which encapsulates the air temperature control thermistor and a high air temperature alarm thermistor, and back to the impeller. When the Access Panel of the Hood is open, the Air Curtain Cover is raised permitting a portion of the air to flow upward past the opening (Figure 3.1) creating a warm air shield which minimizes the drop in Incubator temperature.

3.2.2 TEMPERATURE CONTROL

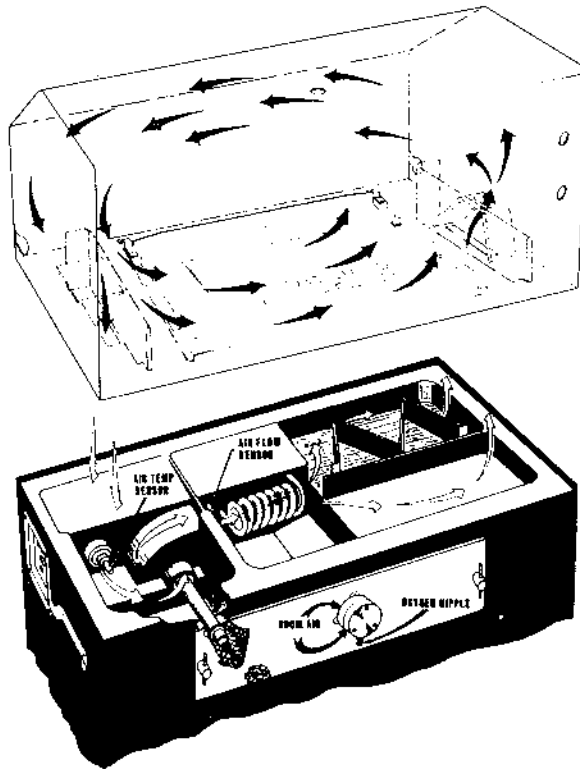
In the Model C100, Incubator temperature is regulated using either Incubator air or infant's skin temperature as the controlling parameter; the desired mode is selected by a front panel switch. The Model C200 provides only air temperature control.

In either mode of operation, the heater output is proportional to the amount of heat required to maintain the desired temperature, and relative amount of heat being provided is indicated by the number of lit HEATER output lamps on the front panel. Changes in the number of lamps illuminated indicate the amount of power required to maintain a given temperature. During skin temperature control (Model C100) it provides an indication of the degree of the infant's dependency upon the temperature of its environment to maintain body temperature. Each mode of operation is described below.

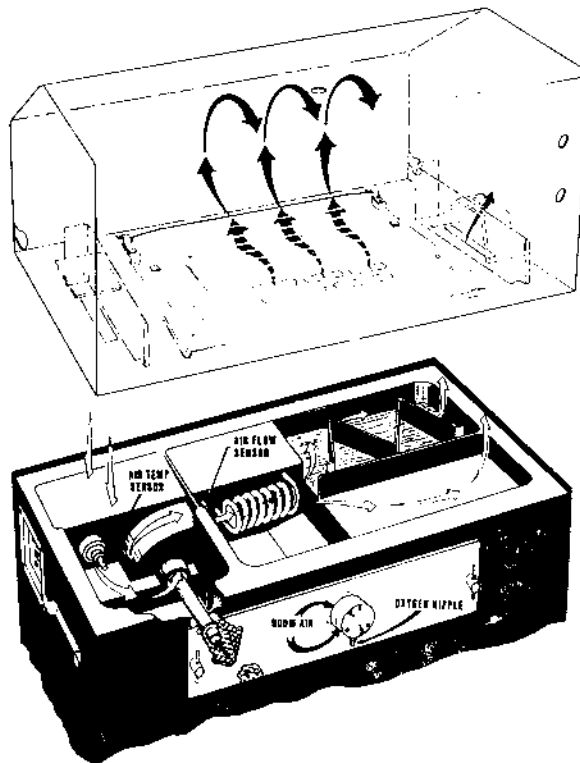
AIR TEMPERATURE MODE (Models C100 and C200). In this mode of operation, the air temperature can be maintained from 20.0 to 38.5°C as selected by the AIR SET TEMP °C thumbwheel switch on the front panel. The Incubator temperature is monitored by a probe located below deck and compared with the thumbwheel settings. The information from this probe is supplied to the heater control circuitry which proportions the heater output to maintain the thumbwheel setting. Actual air temperature is displayed on the Air Temperature Display. A second sensor within the air-temperature probe serves as a backup to limit the temperature sensed below deck to between 39.0 and 40.0°C; at this temperature an alarm is activated and the heater is shut off.

If desired, an auxiliary probe can be used to monitor and control the Incubator air temperature. This probe is suspended above the mattress through the weighing scale hole and plugged into a special receptacle on the side of the Incubator. When plugged in, the primary air temperature probe is disconnected, but the backup sensor within the primary temperature probe remains connected. Thus, the auxiliary probe becomes the controlling element for the air temperature.

In the Air Temperature mode of operation, the infant's temperature will be a function of the air temperature and the infant's ability to establish and maintain its own temperature. A small infant, or one with underdeveloped homeostatic control, may not be able to maintain a stable temperature at the optimum level.



AIR CIRCULATION WITH INCUBATOR DOOR CLOSED



AIR CIRCULATION WITH INCUBATOR DOOR OPEN

FIGURE 3.1 AIR/O₂ CIRCULATION SYSTEM

SKIN TEMPERATURE MODE (Model C100). In this mode of operation, the infant's skin temperature can be maintained at a temperature from 34.0 to 37.9°C as selected by the SKIN SET TEMP° C thumbwheel switch on the front panel. A temperature sensing probe is attached directly to the infant's skin; the information from the probe is supplied to the heater control circuitry which proportions the heater output to maintain the skin set temperature. The air temperature set temp does not control air temperature while in the skin temperature mode, but actual air temperature is still displayed. The air temperature probe (or a properly installed auxiliary probe) still limits the air temperature to 38.5°C. If the Mode Selector Switch is set to the Air Temperature mode while the skin probe remains connected, the Skin Temperature display will continue to display actual skin temperature, but will not control. If the probe is disconnected from its receptacle at any time (Skin mode of operation), the Skin display blanks and an alarm is activated. The backup sensor within the Air Temperature probe remains in the circuit to limit maximum displayed air temperature to between 39.0 and 40.0°C.

3.2.3 ALARMS

The Incubator is equipped with a system of alarms and temperature protection devices. Alarm indications are provided for power failure, inadequate air flow, probe failure, high temperature, and variation from set temp. Each time the unit is turned on, the unit is automatically stepped through an alarm check sequence to verify proper alarm function. After the automatic alarm check is made, the low set temp alarm is disabled for about 60 minutes, or until the temperature reaches set temp, whichever occurs first; each of these alarms is described below.

AIR FLOW ALARM (Models C100 and C200). A sensor located below deck in the normal air path of the fan controls this alarm. If air flow stops due to a fan failure, the temperature of the self-heated sensor rises causing the AIR FLOW alarm on the front panel to light and produces a pulsating audible tone. A short-circuited air flow sensor failure will also actuate the alarm within 9 to 18 seconds of the occurrence of the failure. This alarm is non self-resetting and cannot be cancelled by the Alarm SILENCE/RESET Button until the alarm condition is corrected.

HIGH TEMPERATURE ALARM (Models C100 and C200). A second sensor within the Air Temperature Probe sounds this alarm if the sensed temperature exceeds $39.5 \pm 0.5^\circ\text{C}$. A high temperature alarm is indicated by a flashing light and a continuous audible tone. This alarm is non self-resetting and cannot be cancelled by the Alarm SILENCE/RESET Button until the alarm condition is corrected.

POWER FAILURE ALARM (Models C100 and C200). If primary power to the incubator is interrupted for any reason, including a disconnected power cord, an audible alarm is activated and an alarm lamp lights. This alarm can be deactivated only by restoring the primary power or setting the Incubator POWER Switch off.

PROBE ALARM. Circuitry is provided to monitor the air, skin* and high temperature sensors for short-circuited, open-circuited, or disconnected conditions and the air flow sensor for open condition.

In the Model C100 Incubator, an indicator light flashes and an audible alarm sounds within 9 to 18 seconds to indicate a defective air temperature, skin temperature or auxiliary sensor or an open-circuited air flow sensor (see IMPORTANT). The probe alarm is also actuated if the skin temperature probe is disconnected while in the Skin Mode.

The Model C200 Incubator is equipped only for air control; therefore, no skin probe alarm is provided. The probe alarm is actuated to indicate a defective air temperature or auxiliary sensor or an open-circuited air flow sensor (see IMPORTANT).

IMPORTANT: The probe alarm will be actuated within 9 to 18 seconds if the air flow sensor is open-circuited and the temperature sensed below the mattress deck is greater than approximately 30°C ; however, if the temperature sensed below the mattress deck is less than approximately 30°C , the alarm will not be actuated. During warm-up, it can take anywhere from 15-30 minutes before the alarm actuates, depending on the temperature set point and ambient room temperature. The "probe alarm" indicating an open-circuited air flow sensor will not occur if the set point temperature is below 29°C .

In either Incubator, if a probe shorts (except for the air flow probe), it will appear as a high set temp violation, and the set temp alarm will light. This alarm is not self-resetting and cannot be cancelled by the Alarm SILENCE/RESET Button until the alarm condition is corrected. If a probe alarm occurs simultaneously with a set temp alarm, a shorted probe is probably the true cause of the alarm, since a shorted probe will appear as a high temperature condition.

SET TEMP ALARM. The Set Temp alarm is actuated if skin* or air temperature fluctuates from set temperature as follows:

*Skin Temperature $+1.0 \pm 0.3^\circ\text{C}$
 $-1.0 \pm 0.3^\circ\text{C}$
Air Temperature $+1.5 \pm 0.5^\circ\text{C}$
 $-3.0 \pm 0.5^\circ\text{C}$

A temperature below the set temp is indicated by a flashing light, a pulsating audible tone, and a low temperature reading; a temperature above the set temp is indicated by a flashing light, a continuous audible tone, and a high temperature reading. If a set temp alarm occurs simultaneously with a probe alarm, a shorted probe is probably the true cause of the alarm, since a shorted probe will appear as a high temperature condition.

The set temp alarm is self-resetting; that is, if the alarm condition is corrected, the audible alarm is automatically silenced and the light is turned off.

The audible set temp alarm can be silenced by depressing the SILENCE/RESET button; the activation of other audible and visual alarms will not be affected by use of the 15 minute audible alarm silence. When silenced, the alarm lamp will remain on until the alarm condition is corrected. If the alarm condition is not corrected within 15 minutes, the audible alarm will be reactivated.

*Model C100 only.

SECTION 4 OPERATION

4.1 OPERATING CONTROLS, INDICATORS, AND CONNECTORS

All controls, indicators, and connectors required for operation of the Incubator are shown in Figure 4.1. An explanation of each item is provided in Table 4.1.

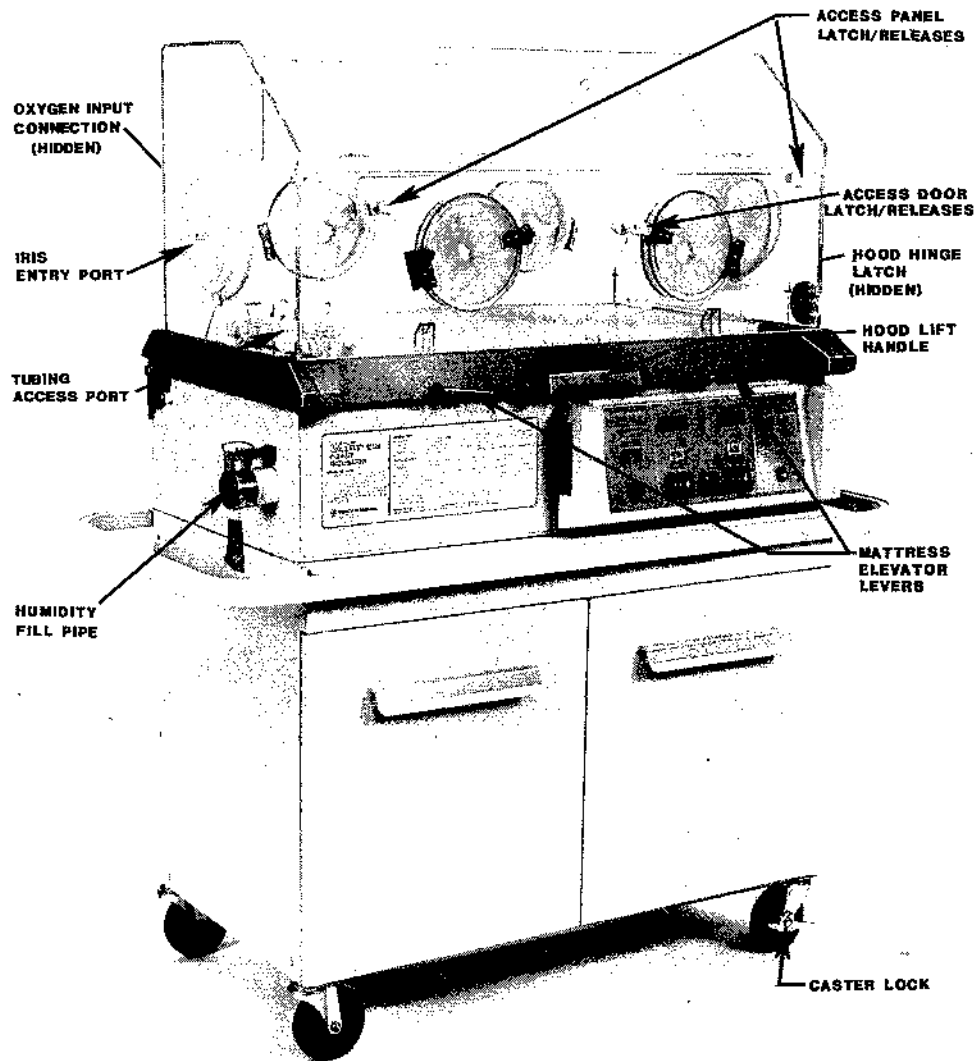


FIGURE 4.1 OPERATING CONTROLS, INDICATORS, AND CONNECTORS
(SHEET 1 OF 4)

TABLE 4.1 CONTROLS, INDICATORS, AND CONNECTORS

NAME	DESCRIPTION
INCUBATOR	
Hood Lift Handle	Used to lift Hood assembly for cleaning or maintenance.
Hood Hinge Latch	Located on right rear corner of Incubator, latches Hood Assembly in open position; releases when depressed.
Mattress Elevator Levers	Used to position mattress in Fowler or Trendelenberg position.
Iris Entry Port	Provides access to infant compartment.
Access Door Release/Latch	Releases/Latches Access Door.
Access Panel Release/Latch	Rotated to latch or release Access Panel.
Humidity Fill Pipe	Provides means of filling humidity reservoir.
Tubing Access Port	Provides routing for tubing, probe leads, etc. into infant compartment.
Castor Lock	Located on diagonal corners of cabinet stand, restricts Incubator movement.
Oxygen Input Connection	Located on rear of Incubator, provides connection point to Oxygen Limiter.

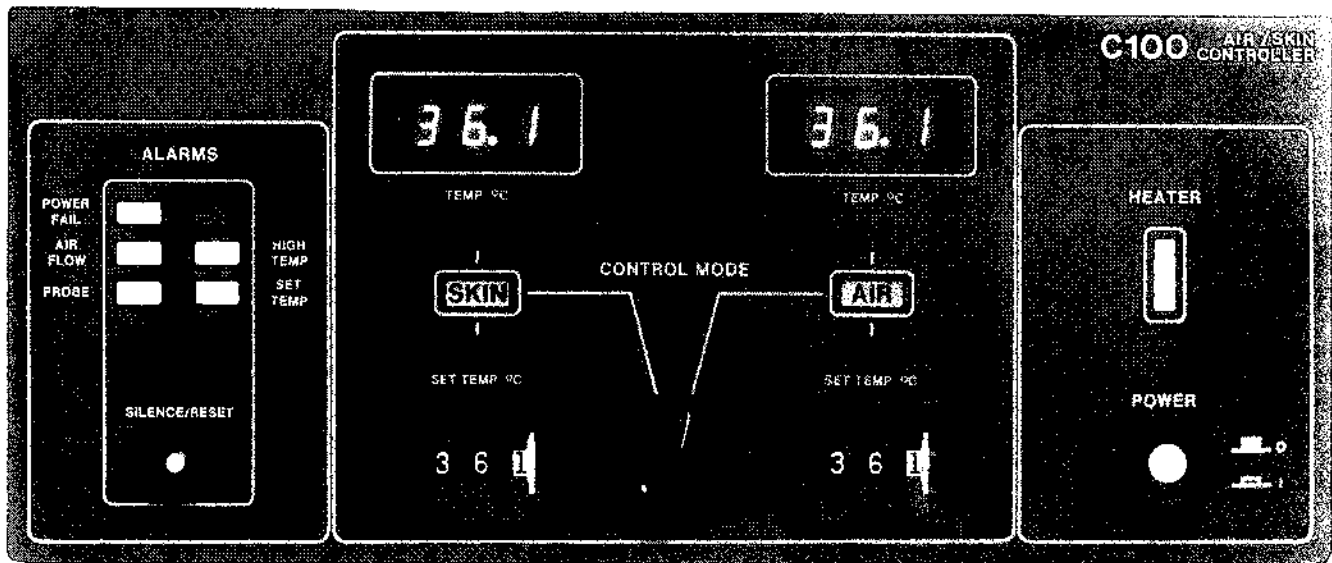


FIGURE 4.1 OPERATING CONTROLS, INDICATORS, AND CONNECTORS - MODEL C100
(SHEET 2 OF 4)

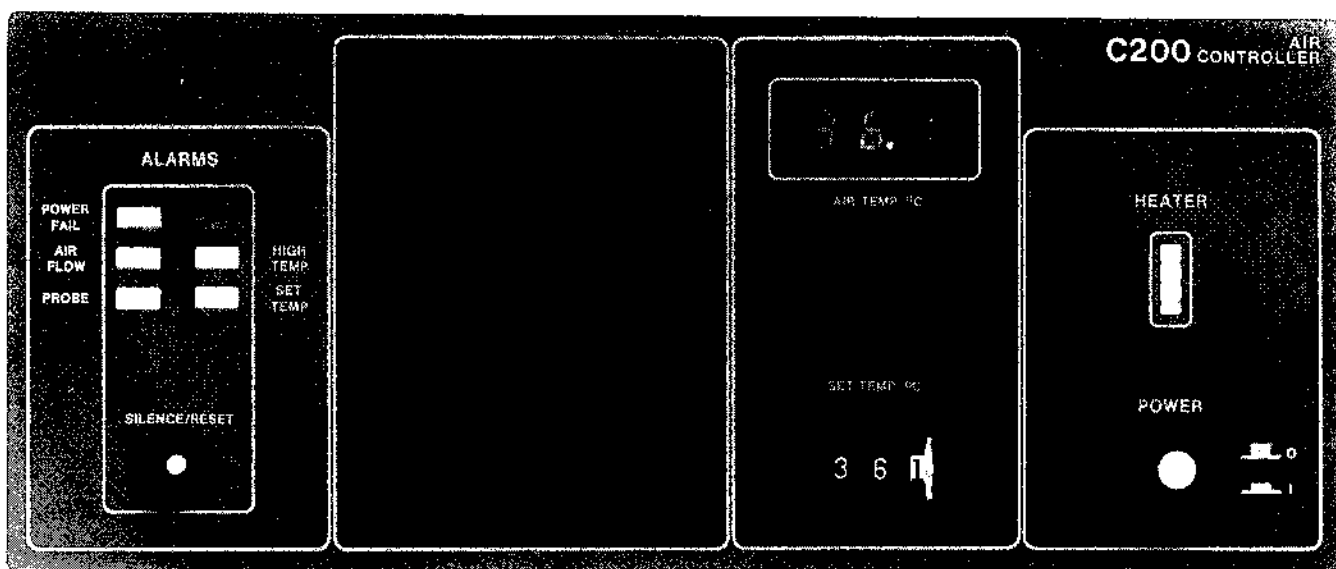


FIGURE 4.1 OPERATING CONTROLS, INDICATORS, AND CONNECTORS - MODEL C200
(SHEET 3 OF 4)

TABLE 4.1 CONTROLS, INDICATORS, AND CONNECTORS (CONT.)

NAME	DESCRIPTION
FRONT PANEL	
CONTROLS	
POWER	Turns Incubator on or off; illuminates when power is on. When first turned on, the Incubator is automatically stepped through a functional test sequence.
*CONTROL MODE	Selects SKIN or AIR temperature mode of control.
*SKIN SET TEMP °C	Thumbwheel switch to adjust skin temperature set temp. Setting is adjustable from 34.0 to 37.9°C.
AIR SET TEMP °C	Thumbwheel switch to adjust air temperature set temp. Setting is adjustable from 20.0 to 39.9°C, but actual air temperature is limited to 38.5°C.
SILENCE/RESET	<p>Silences the audible portion of set temp alarm for nominally 15 minutes; alarm silence is automatically overridden if another alarm occurs within the period of silence.</p> <p>Also functions as alarm reset for air-flow, high temp and probe alarms, but only after alarm condition is corrected.</p>
INDICATORS	
HEATER	Provides indication of relative heater output.
*AIR Temperature Mode	Indicates Air temperature control mode of operation.
AIR TEMP °C	Digital display of Incubator temperature in air or skin* temperature control mode.
*SKIN Temperature Mode	Indicates skin temperature control mode.
*SKIN TEMP °C	Digital display of skin temperature, whether in air or skin temperature mode of operation; display is blank if patient probe is disconnected.
ALARMS	
AIR FLOW	Light flashes and a pulsating alarm sounds to indicate fan failure or a short-circuited air flow sensor. This alarm is not self-resetting and cannot be cancelled or reset until the alarm condition is corrected.

*Model C100 only.

TABLE 4.1 CONTROLS, INDICATORS, AND CONNECTORS (CONT.)

NAME	DESCRIPTION
FRONT PANEL (CONT.)	
ALARMS (CONT.)	
PROBE	<p>Light flashes and a pulsating alarm sounds to indicate a defective air temperature, skin* temperature or auxiliary sensor or an open-circuited air flow sensor (see IMPORTANT).</p> <p>Also actuated if skin* temperature probe is disconnected while in Skin* Mode. This alarm is not self-resetting and cannot be cancelled or reset until the alarm condition is corrected.</p> <p>IMPORTANT: The probe alarm will be actuated within 9 to 18 seconds if the air flow sensor is open and the temperature sensed below the mattress deck is greater than approximately 30° C.</p>
SET TEMP	<p>* Skin Mode: Light flashes to indicate that skin temperature is 1° C above or below skin set temp. Continuous audible alarm indicates 1° C above; pulsating audible alarm indicates 1° C below.**</p> <p>Air Mode: Light flashes to indicate that air temperature is 1.5° C above or 3° C below set temp. Continuous audible alarm indicates above; pulsating audible alarm indicates below.**</p> <p>The set temp alarm is self-resetting; that is, if the alarm condition is corrected, the audible alarm is automatically silenced and the light is turned off.</p> <p>The audible set temp alarm can be silenced by depressing the SILENCE/RESET button; the activation of other audible and visual alarms will not be affected by use of the 15 minute audible alarm silence. When silenced, the alarm lamp will remain on until the alarm condition is corrected. If the alarm condition is not corrected within 15 minutes, the audible alarm will be reactivated.</p>
HIGH TEMP	<p>Light flashes to indicate high Incubator temperature; a continuous audible tone also sounds. This alarm is not self-resetting and cannot be cancelled by the Alarm SILENCE/RESET Button until the alarm condition is corrected.</p>
POWER FAIL	<p>Lights steady to indicate that primary power to the Incubator has been interrupted; a steady audible alarm also sounds. This alarm can be deactivated only by restoring primary power or setting the Incubator POWER switch to off.</p>

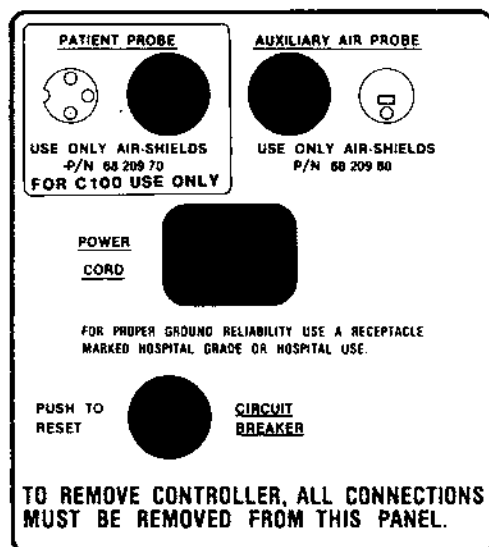
*Model C100 only.

**Each time unit is turned on the low set temp alarm for the selected mode is delayed for about 1 hour or until the temperature stays within set temp for about 2-½ minutes.

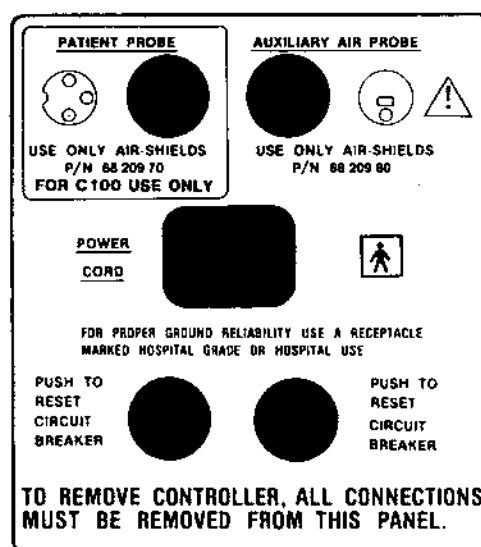
TABLE 4.1 CONTROLS, INDICATORS, AND CONNECTORS (CONT.)

NAME	DESCRIPTION
SIDE PANEL	
CONTROL	
CIRCUIT BREAKER(S)	Provide overload protection; depress to reset.
CONNECTORS	
*PATIENT PROBE	Accepts skin temperature probe for monitoring and controlling infant skin temperature. When connected, SKIN TEMP °C indicates temperature sensed by probe; when disconnected, SKIN TEMP °C is blank.
AUXILIARY AIR PROBE	Accepts auxiliary air temperature probe and disconnects the internal air temperature probe to permit air temperature control by auxiliary probe.
POWER CORD	Accepts AC power cord.

*Model C100 only.



100V, 110/120V MODELS



220/240V MODELS

**FIGURE 4.1 OPERATING CONTROLS, INDICATORS, AND CONNECTORS
(SHEET 4 OF 4)**

4.2 OPERATION

The operating procedure is divided into two main sections: General Operation and Functional Checkout Procedure (4.2.1), and Operation During Use (4.2.2). The operational checkout should be performed each time the Incubator is put into service to verify proper operation of all functions. The operation section should be used for subsequent routine operation.

WARNING:

- The Incubator should not be used if it fails to function as described. Service should be referred to qualified personnel.
- The use of infant seats, head hoods or other accessories within the Incubator which can alter the air flow pattern may affect temperature uniformity, temperature variability, the correlation of the Incubator temperature reading to center mattress temperature and infant skin temperature.

4.2.1 GENERAL OPERATION AND FUNCTIONAL CHECKOUT PROCEDURE

The functional checkout should be performed before the Incubator is first placed into use and after any disassembly for cleaning or maintenance.

A. BEFORE CONNECTING THE INCUBATOR to the power source, depress the POWER switch; the power failure alarm should sound, and the POWER FAIL indicator should light. This tests the operation of the power failure alarm circuit and ensures that the rechargeable battery that powers the circuit is in good condition. Depress the POWER switch a second time to silence the alarm.

B. CONNECT THE POWER CORD.

CAUTION: Make sure that the building power source is compatible with the electrical specifications shown on right side of the Incubator. For proper grounding reliability, connect the power cord only to a properly marked 3-wire hospital grade or hospital use receptacle. Do not use extension cords.

C. ON THE MODEL C100, set the CONTROL MODE switch to the AIR position.

D. DEPRESS THE POWER SWITCH. When on, the switch is illuminated. When initially turned on, the power unit performs a 5-second self test, all alarm lamps light, the audible alarm is pulsed, and each temperature display (two in C100, one in C200) shows 3 eights (88.8). If any function does not occur, the unit requires service.

IMPORTANT:

- This test should be performed on a daily basis.
- The self test tests the lamps displays, and audible alarms, but does not completely simulate a functional failure.

E. ADJUST THE AIR SET TEMP° C THUMBWHEEL SWITCH TO 34.0. All four HEATER lamps should light, indicating full heater output.

NOTE: Allow the unit to operate while continuing the operational checkout.

F. CHECK HOOD HINGE AND LATCH OPERATION for proper positioning. Using the Hood Lift handle, slowly tilt the Hood back until the Hood Latch engages. Close the Hood by releasing the Hood Latch as shown in Figure 4.2.



FIGURE 4.2 HOOD RELEASE OPERATION

G. CHECK ACCESS PANEL DETENT. Rotate both latch/releases inwardly and open the Access Panel as shown in Figure 4.3; the Air Curtain Cover should rise slightly as the Access Panel opens, and the detents should create a noticeable "drag" during initial movement of the panel. Pivot the Access panel to the full open position (hanging straight down).

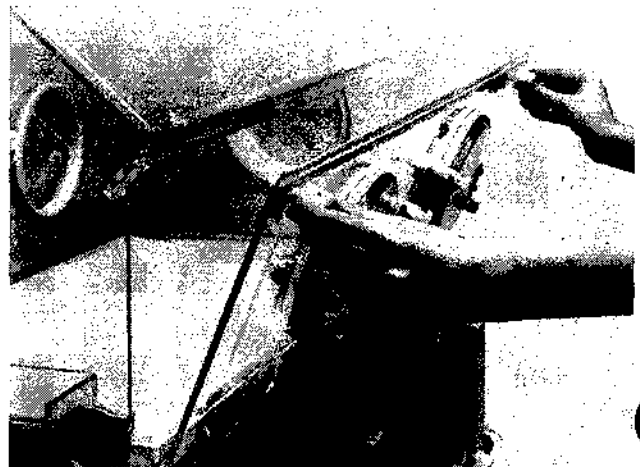
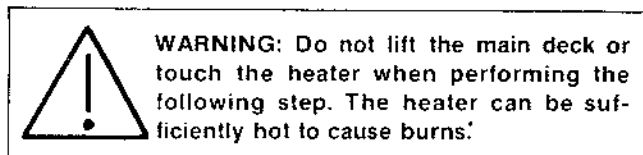


FIGURE 4.3 ACCESS PANEL OPERATION

- H. CHECK AIR CURTAIN COVER.** Remove Mattress Tray by lifting straight up to clear the rails on the hood baffles and then withdrawing through the front of the Incubator. Check that the rear curved edge of the Air Curtain Cover is retained by the 1/4" rod between the Mattress Tray rails and that the front edge is about 1" above the Main Deck.



- I. CHECK MAIN DECK** by pivoting the Air Curtain Cover to the vertical position and checking the Main Deck Retainer; the retainer should be positioned as shown in Figure 4.4. Lower the Air Curtain Cover and reinstall the Mattress Tray.

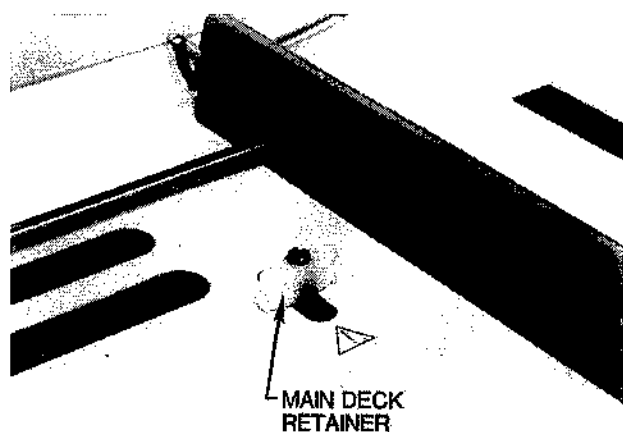


FIGURE 4.4 MAIN DECK RETAINER

- J. CHECK MATTRESS TRAY** by sliding it out to the fully extended position as shown in Figure 4.5. Lean on Mattress Tray; make sure it is properly supported by the rails and baffles to provide a firm infant platform.

- K. CHECK ACCESS PANEL LATCHES** by closing the Access Panel and rotating both latches until fully engaged. Both latches must be fully engaged to avoid accidental opening of the Access Panel.

- L. CHECK ELBOW LATCH ACCESS DOORS.** Gently press the door release with an elbow, as shown in Figure 4.6. Each Access Door should swing open. Close the doors and check for proper latching.

- M. CHECK IRIS ENTRY PORTS.** Rotate the outer ring of each Iris Port; the iris should open and close as rotation is continued through 360°.

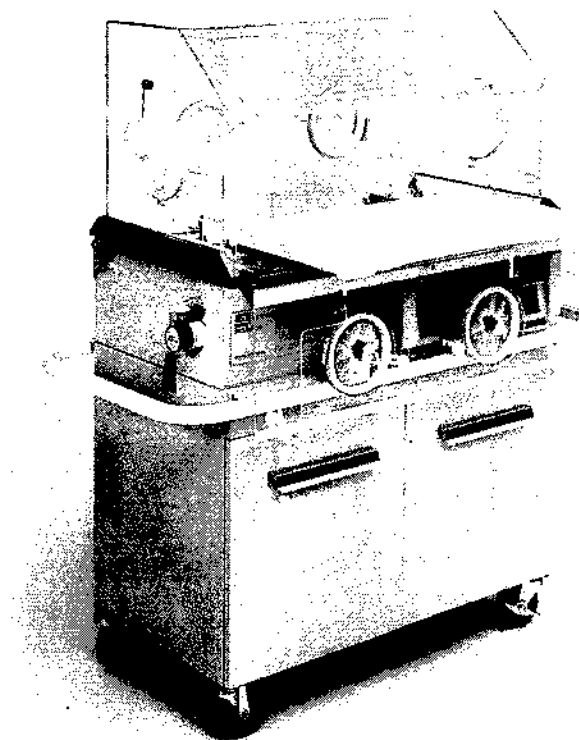


FIGURE 4.5 MATTRESS TRAY OPERATION

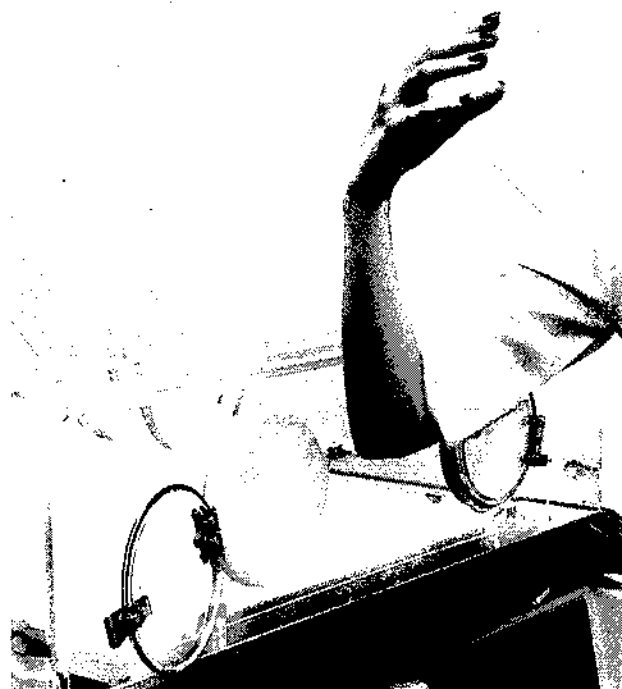


FIGURE 4.6 ACCESS DOOR OPERATION

- N. CHECK MATTRESS ELEVATORS.** Separately operate each Mattress Elevator by rotating handles downward as shown in Figure 4.7.



FIGURE 4.7 MATTRESS ELEVATOR OPERATION

NOTE: These elevator levers are provided to permit the infant to be positioned in Trendelenburg or Fowler position. Do not elevate both ends of the mattress at the same time except for possible use during magnification x-ray procedures. Never leave the infant unattended while both elevators are raised.

NOTE: The Hood cannot be opened when either Mattress Elevator is raised.

WARNING: A dirty Air Intake Microfilter may affect oxygen concentrations and/or cause Carbon Dioxide buildup. The filter must be checked on a routine basis and changed at least every three months.

- O. CHECK THE AIR INTAKE MICROFILTER.** Loosen the two thumbscrews of the Air Intake Filter Cover and remove the cover as shown in Figure 4.8. Inspect the microfilter; if visibly dirty it should be replaced. Refer to paragraph 5.9 for additional instructions.

- P. CHECK AIR/OXYGEN SYSTEM** by introducing a carefully measured 8 LPM of oxygen, then monitoring levels within hood to verify that they reach the predicted level as indicated on the Filter Cover Assembly.

- Q. CHECK AIR TEMPERATURE MODE OF OPERATION.**

With all access openings closed, allow the Incubator to warm up to the thumbwheel setting (34.0°C); it should take approximately one hour or less. While the unit is warming up, suspend the auxiliary probe through the hole in the top of the Incubator Hood and position the patient probe* in the center of the mattress surface; do not connect the probe plugs to the receptacles. When the AIR TEMP°C Display has stabilized, the number of HEATER Indicator lamps illuminated will typically be reduced to no more than two. Check that the digital display remains within 0.5°C of set temp for 15 minutes after stabilization.

- R. CHECK AIR SET TEMP ALARM** by setting the AIR SET TEMP°C thumbwheel first to 32.0°C, then to 38.0°C. An audible and visual alarm should activate at each setting after a 9 to 18 second delay, and cancel when the setting is returned to the display reading.

- S. CHECK AUXILIARY PROBE.** Insert the Auxiliary Probe connector into the AUXILIARY AIR PROBE receptacle. Set the AIR SET TEMP°C thumbwheel to 34.0°C. When AIR TEMP°C Display has stabilized, the number of HEATER Indicator Lamps illuminated will typically be reduced to no more than two. Check that the digital display remains within 0.5°C of set temp for 15 minutes after stabilization.

- *T. CHECK SKIN TEMPERATURE MODE OF OPERATION.** Connect the Patient Probe plug to the PATIENT PROBE Receptacle and set the SKIN SET TEMP°C thumbwheel to 36.0°C. Set the CONTROL MODE Switch to the SKIN position. When the SET TEMP alarm actuates, depress the Alarm SILENCE/RESET Button.

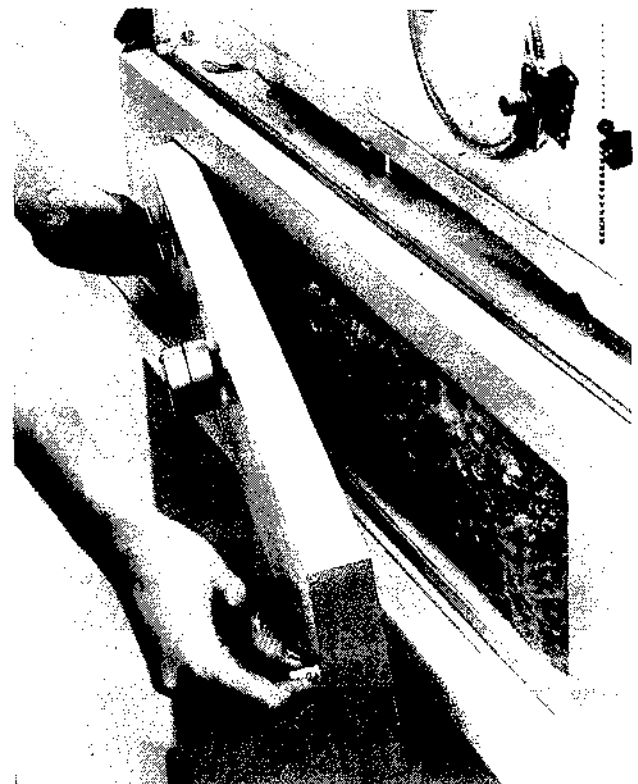


FIGURE 4.8 FILTER COVER REMOVAL

*Model C100 only.

***U. CHECK SKIN SET TEMP ALARM.** Allow Incubator Temperature to stabilize at 36.0°C. Leave the CONTROL MODE Switch in the SKIN position and set the SKIN SET TEMP°C thumbwheel to 37.5°C, then to 34.5°C. An audible and visual alarm should activate at each setting and cancel when the setting is returned to the display reading.

***V. CHECK SKIN PROBE ALARM.** Leave the CONTROL MODE Switch in the SKIN position and disconnect the Patient Probe from the receptacle. The audible and visual alarms should activate, the SKIN TEMP°C digital display should blank, and the HEATER Indicator Lamps should all go off. When the Skin Probe is reconnected, the Incubator should return to normal operation.



WARNING: The Controller heater can be sufficiently hot to cause burns; avoid removing the Controller or touching the heater until the unit has been switched off for at least 45 minutes.

W. CHECK AIR FLOW ALARM. Set the POWER switch to OFF. Remove the Controller (Figure 5.1) from the Incubator. Remove the fan impeller from the fan motor shaft, and reinstall the Controller in the Incubator. Set the POWER switch to ON and wait for the end of the Auto-Test cycle (5 seconds). Within 5 minutes, the AIR FLOW indicator should flash, a pulsating audible alarm should sound, and all HEATER lights should go out. Reinstall the fan impeller and restore the Incubator to normal operating condition before proceeding.

X. CHECK MAXIMUM AIR TEMPERATURE. On the Model C100, position the probe end of the Patient Probe outside the Incubator (leave the CONTROL MODE Switch in the SKIN position) and set the SKIN SET TEMP°C thumbwheel switches to 39.9°C. On the Model C200, set the thumbwheel switches to 39.9°C. Allow the incubator to heat. If the SET TEMP alarm actuates, depress the Alarm SILENCE/RESET Button.

The Incubator should not heat above 38.4°C ± 0.4°C, as indicated on the AIR TEMP°C display.

Y. CHECK HIGH TEMPERATURE ALARM. Position probe end of auxiliary probe outside the Incubator. If the SET TEMP alarm actuates, depress the Alarm SILENCE/RESET Button. When the HIGH TEMPERATURE Alarm actuates, disconnect the auxiliary probe and read the AIR TEMP°C display; the display should read 39.5 ± 0.5°C.

Z. CHECK THE OXYGEN INPUT VALVE FILTER. The Oxygen Input Valve Filter Cartridge should be checked once every four months and replaced if the ends are gray or black. Refer to the Service Manual and qualified service personnel.

AA. CHECKOUT IS COMPLETE. Disconnect and store the Auxiliary and Patient* Probes. If the Incubator is to be used, set the CONTROL MODE* Switch to the AIR position and leave the Incubator running until ready for use. If it is not going to be used it may be shut off.

4.2.2 OPERATION DURING USE

IMPORTANT: The Incubator should not be placed in service unless the General Operation and Functional Checkout Procedure (4.2.1) has been performed.

The Incubator should be ventilated and prewarmed in the air temp control mode to the temperature prescribed by the attending physician or according to Nursery Standing Orders. Incubator should be run with no water in humidity reservoir during prewarming.

NOTE: The air curtain that functions when the Access Panel is open is very delicate and can be disturbed by drafts, fans, air-conditioning, etc. Take necessary measures to keep the Incubator away from these drafts.

WARNING:

- For infant safety, do not leave the infant unattended while the Access Panel is open.
- The Mattress temperature may rise above the preset level if the Access panel is left open. Therefore, do not leave it open longer than essential. The air temperature indicator does not accurately reflect Incubator temperature when the Access Panel is open unless the Auxiliary Probe is being used.
- When the Access Panel is opened, a curtain of warm air flows from beneath the front edge of the mattress toward the top of the Access Panel opening. The temperature of this air curtain is higher than the typical Incubator air temperature, therefore the infant should be kept clear of this warm air path.
- Raising the Hood if leads or tubing are connected to the infant can result in harm to the infant. There should be no need to raise the hood at any time while the infant is cared for in the Incubator. All necessary access to the infant can be achieved by means of the Access Panel, Access Doors, and Iris Entry Ports.
- Phototherapy units located too close to the Incubator may affect hood wall temperature, Incubator air temperature and infant skin temperature.

*Model C100 only.

A. PLACE INFANT IN INCUBATOR through opened Access Panel. Mattress Tray should be pulled out to stop as shown in Figure 4.5. Return Mattress Tray to normal use position and close Access Panel. Both Access Panel Latches must be positively secured to avoid accidental opening.

B. ON THE MODEL C100, SELECT TEMPERATURE CONTROL MODE (AIR OR SKIN); the Model C200 operates with Air Temperature Control only.

IMPORTANT: The temperature control mode and temperature settings should be prescribed by the attending physician. Infant's rectal and/or axillary temperature should be routinely monitored according to the attending physician's orders or Nursery Standing Orders.

Air Temperature Control. Set the CONTROL MODE* Switch to the AIR position and set the AIR SET TEMP°C thumbwheel to the prescribed temperature. Once stabilized, the Incubator temperature will be maintained within 0.5°C of set temp. Note the following:

- The number of HEATER lights illuminated provides an indication of the amount of heater output required to maintain the Incubator air temperature
- The AIR TEMP °C Display indicates Incubator Temperature.
- If a Skin Probe is connected to the PATIENT PROBE Receptacle, the SKIN TEMP °C Display will indicate temperature; otherwise, this display will be blank

Auxiliary Probe Air Temperature Control. If desired, the auxiliary probe can be used in the Air Temperature Control Mode of operation. When used, this probe automatically takes the place of the primary Air Temperature Probe which is located below the main deck. Otherwise, the unit functions as described under **Air Temperature Control**.

Insert the probe end through the hole on the top of the Hood. Make sure the probe hangs freely inside the incubator. To use the probe, insert its plug into the AUXILIARY AIR PROBE receptacle.



WARNING: For proper temperature control, the Auxiliary Probe must be directly beneath the hole in the Hood. Do not operate the Incubator with the Auxiliary Probe outside the Incubator or other than as recommended. Overheating will occur.

*Model C100 only.

***Skin Temperature Control.** Connect the plug of the Skin Temperature Probe to the PATIENT PROBE Receptacle. Insert the probe into the hood compartment through the right Tubing Access Port as shown in Figure 4.9.

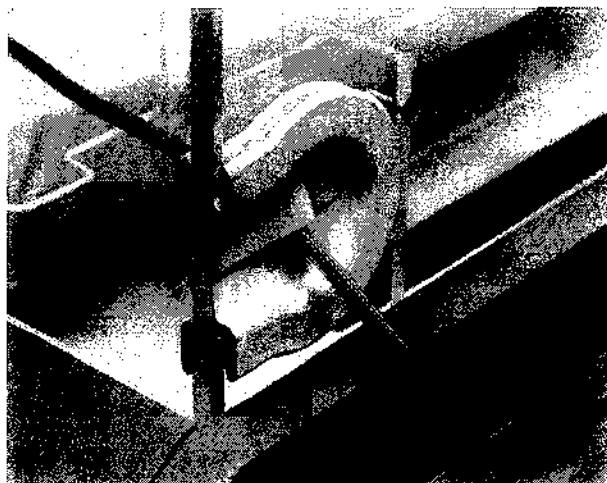


FIGURE 4.9 TUBING ACCESS PORT

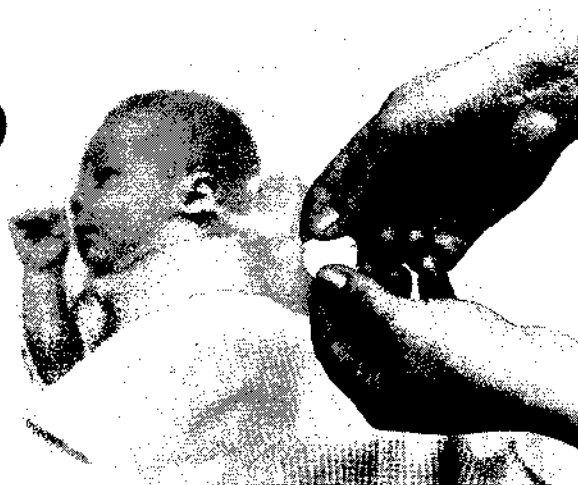
The skin area where the probe is to be placed should be thoroughly cleaned and dried before the probe is placed on the skin. When the infant is on its back or side, the Probe should be placed on the abdomen, halfway between the xyphoid and the umbilicus. When the infant is prone, the probe should be on the infant's back. The probe must never be placed under the infant or used rectally.

Attach the probe to the infant using an Air-Shields SoftSpots™ Probe Cover, as shown in Figure 4.10. To stabilize the attached probe, place a piece of tape over the probe wire approximately three to four centimeters from the probe tip.

Set the CONTROL MODE Switch to the SKIN position and set the SKIN SET TEMP°C thumbwheel to the desired temperature. Once stabilized, the infant's skin temperature will be automatically controlled within 0.3°C of the set temp.

Note the following:

- The number of HEATER lights illuminated provides an indication of the amount of heater output required to maintain Skin Temperature.
- The SKIN TEMP°C Display indicates actual infant skin temperature.
- The AIR TEMP°C Display indicates actual incubator air temperature necessary to maintain skin temperature. The AIR Temperature setting will have no control of air temperature.



Remove backing from SofSpots™ Probe Cover



Attach Probe

FIGURE 4.10 ATTACHING SKIN PROBE

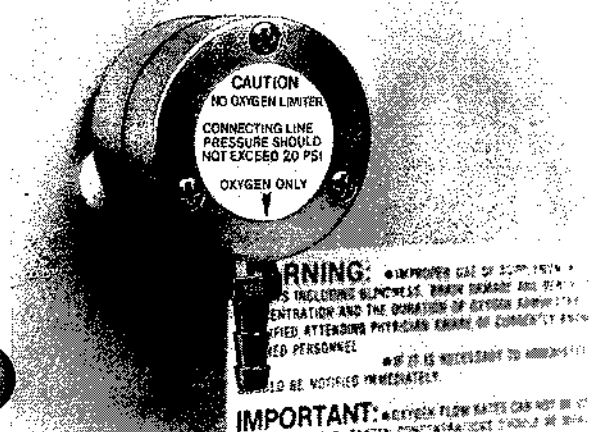


FIGURE 4.11 OXYGEN INPUT VALVE

C. **OXYGEN.** Oxygen can be administered from a wall source or the oxygen cylinder (accessory) on the Incubator Cabinet Stand.

WARNING:

- Improper use of supplemental oxygen can cause serious side effects including blindness, brain damage and death. The risks vary with each infant. The method, the concentration and the duration of oxygen administration should be prescribed by the attending physician.
- If it is necessary to administer oxygen in an emergency, the attending physician should be notified immediately.
- The use of the Vapojet® Humidifier or other means of external humidification will alter predicted incubator oxygen concentrations. Refer to Cat. No. 26 991 30 for operating instructions for the Vapojet® Humidifier.
- The oxygen concentration inspired by an infant does not predictably determine the partial pressure of oxygen (pO_2) in the blood. When deemed advisable by the attending physician, blood pO_2 should be measured by accepted clinical techniques.

NOTE: See current edition of "Guidelines for Perinatal Care" of the American Academy of Pediatrics/The American College of Obstetricians and Gynecologists.

Connect the output of the oxygen flowmeter to the nipple of the Oxygen Input Valve (Figure 4.11), using 3/16-inch ID surgical tubing. An oxygen concentration guide is provided in Figure 4.12. This guide also appears on the Air Input Filter Cover on the back of the Incubator.

OXYGEN CONCENTRATION GUIDE

50Hz - 60Hz OPERATION

OXYGEN INPUT NORMAL RANGE O_2 %

2 lpm	25-30
4 lpm	29-35
6 lpm	33-41
8 lpm	37-48
10 lpm	45-75
12 lpm	65-95

ALLOW 45 MINUTES FOR FINAL CONCENTRATIONS AFTER EACH CHANGE OF OXYGEN FLOW SETTING
NOTE THE ABOVE VALUES ARE INTENDED AS GUIDELINES ONLY. READJUST FLOW AS REQUIRED TO ACHIEVE PRESCRIBED CONCENTRATION. SEE WARNING LABEL AND IMPORTANT OPERATING INSTRUCTIONS.

FIGURE 4.12 OXYGEN CONCENTRATION GUIDE

D. HUMIDITY RESERVOIR. If additional humidification is prescribed by the attending physician, fill the humidity reservoir (Figure 4.13) with 2200 cc of sterile distilled water. A single filling is enough for at least one full day of operation; relative humidity inside the Incubator is typically at 50-60% under these conditions.

NOTE:

- The level of relative humidity attained within the Incubator will be influenced by the ambient relative humidity of the operating environment.
- When the temperature inside the Incubator is significantly higher than the temperature in the nursery, condensation may form on the inside of the hood. When there is relatively little temperature difference between the Incubator and the nursery, condensation will not form. This does not mean the Incubator air is not adequately humidified but rather that the difference in temperature is not great enough to produce condensation.

A relative humidity readout is provided on a disposable humidity card mounted in the upper right rear corner of the Incubator hood. The card should be changed each time the Incubator is cleaned and/or after each useage.

IMPORTANT:

- To minimize contamination in the humidity reservoir, it should be completely drained and refilled daily.
- Never refill a partially filled humidity reservoir; always drain completely before refilling.

E. WEIGHING THE INFANT. A weighing scale is available as an accessory for the Incubator. If used, a weighing sling is suspended from the scale through the hole in the top of the Hood.

NOTE: The scale is set below zero at the factory to compensate for the weight of the hook and sling. If resetting is ever required, place a known weight in the sling and turn the adjustment screw (located in the yoke of the scales) until the correct weight shows on the scale. Do not attempt resetting without a known weight as the empty sling is not heavy enough to give an accurate zero point.

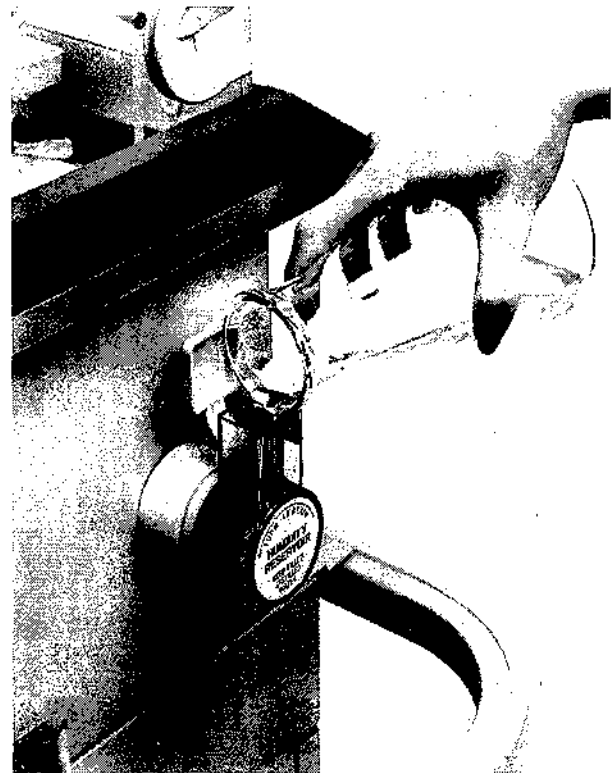


FIGURE 4.13 FILLING HUMIDITY CHAMBER

SECTION 5

CLEANING AND MAINTENANCE

5.1 GENERAL

This section provides cleaning and maintenance instructions. Where necessary, disassembly instructions are provided. Maintenance other than that provided in this section should be performed only by qualified service personnel.

5.2. CLEANING

When an infant is discharged, or at least once a week, the Incubator should be thoroughly cleaned and disinfected. Cleaning can most effectively be accomplished by disassembling, then grouping the parts and/or assemblies in categories according to the method of cleaning required.

5.2.1 DISASSEMBLY FOR CLEANING

NOTE: For routine cleaning there is no need to separate the Hood/Base assembly from the Cabinet Stand. If separation is necessary refer to the Installation Section.



WARNING: The Controller heater can be sufficiently hot to cause burns; avoid removing the Controller or touching the heater until the unit has been switched off for at least 45 minutes.

A. REMOVE THE CONTROLLER. Disconnect the Power Cord and Probes from the side of the Incubator. Release the latch on each side of the Controller as shown in Figure 5.1, then withdraw the unit from the Incubator.

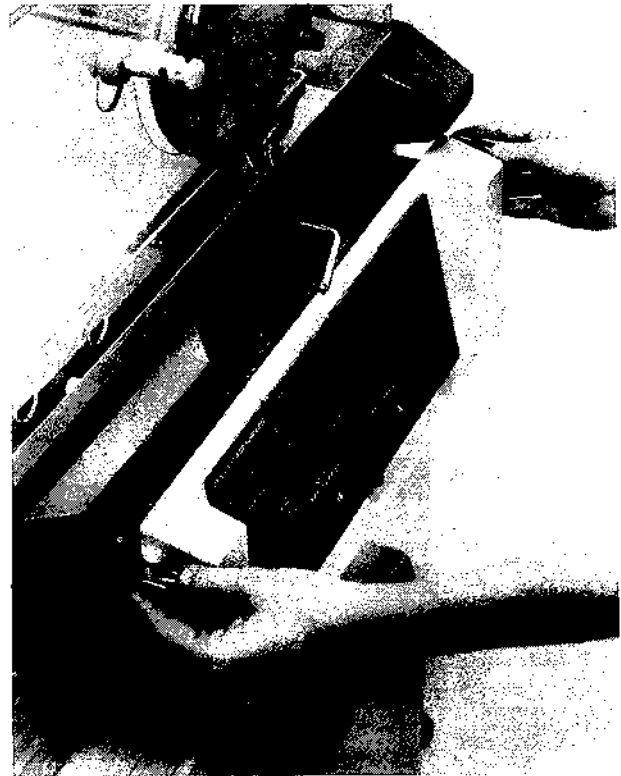
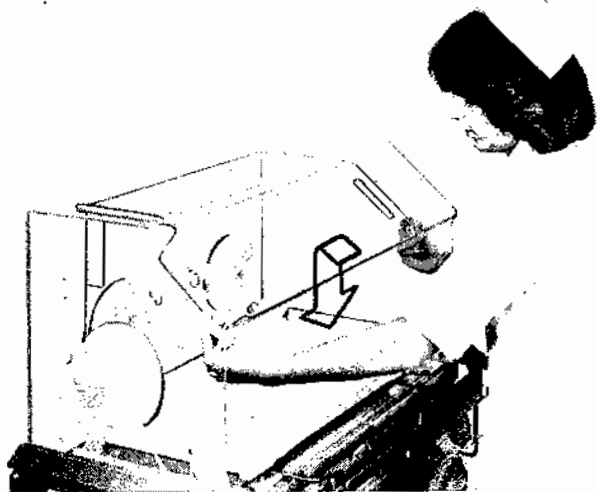
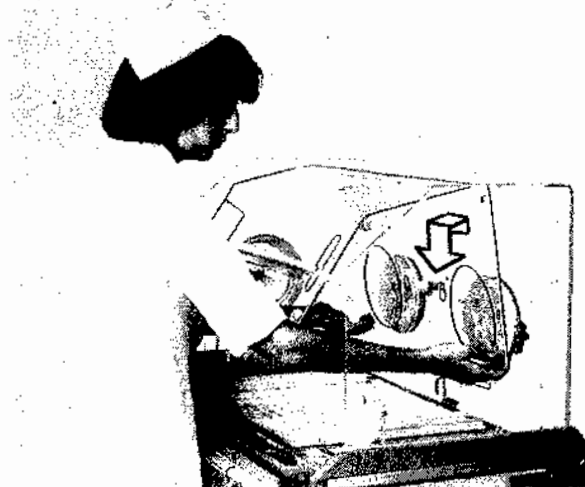


FIGURE 5.1 REMOVAL OF CONTROLLER

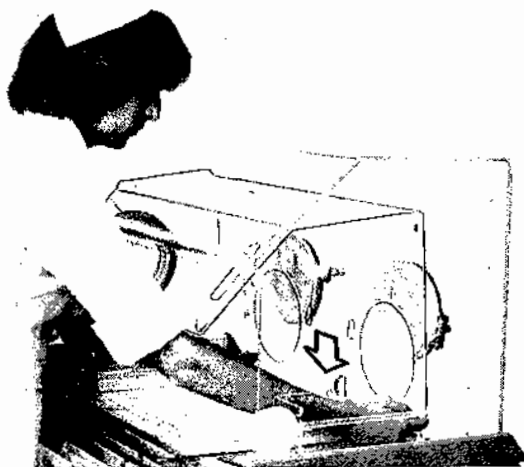
***B. REMOVE THE HOOD INNER WALL.** Remove the Inner Wall as described in Figure 5.2



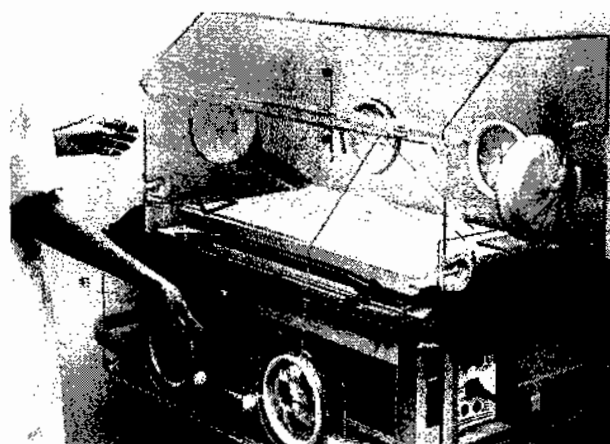
- 1 RELEASE FRONT OF INNER WALL**
by pushing slightly back in direction of hood slope, then down.



- 2 RELEASE REAR OF INNER WALL**
while resting front edge of inner wall on your arm; lift rear of inner wall, pull toward you to release, then lower.



- 3 LOWER REAR OF INNER WALL AS FAR AS IT WILL GO.**



- 4 REMOVE INNER WALL**
by lowering in direction shown.

*Model C100 only.

FIGURE 5.2 REMOVAL OF INNER WALL

- *C. REMOVE ACCESS PANEL INNER WALL (HEAT SHIELD).** Refer to Figure 5.3. With the Access Panel completely open, remove the Inner Wall by simultaneously pulling out at the top and pushing in the downward direction.

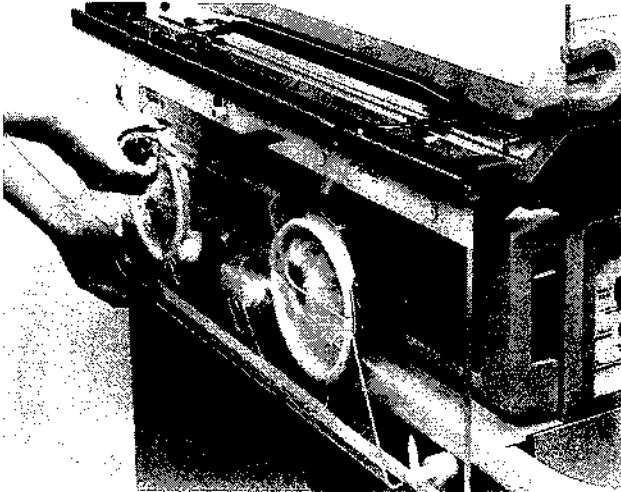


FIGURE 5.3 ACCESS PANEL INNER WALL REMOVAL

- D. REMOVE MATTRESS TRAY AND AIR CURTAIN COVER.** Close the Access Panel and latch the Hood Assembly in the open position, then lift out the Mattress Tray. Remove and discard the disposable mattress cover.

Lift the front of the Air Curtain Cover, swing it toward the back of the Incubator past the vertical position until you feel it snap free, then slide it slightly forward to remove.

- E. REMOVE MAIN DECK.** Rotate the Main Deck Retainer (Figure 5.4) parallel with the slot, then lift out the Main Deck and Hood Seat Gasket.

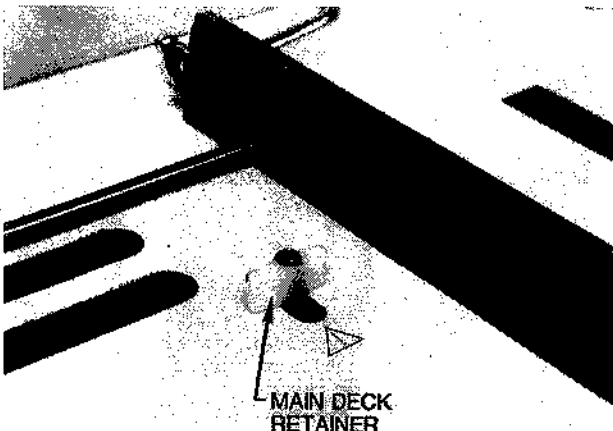


FIGURE 5.4 REMOVAL OF MAIN DECK

*Model C100 only.

- F. REMOVE AIR INTAKE TUBE.** Grasp the Air Intake Tube (Figure 5.5), twist and pull it toward the front of the Incubator until the end of the tube clears the gasket. Remove the tube from the base assembly.

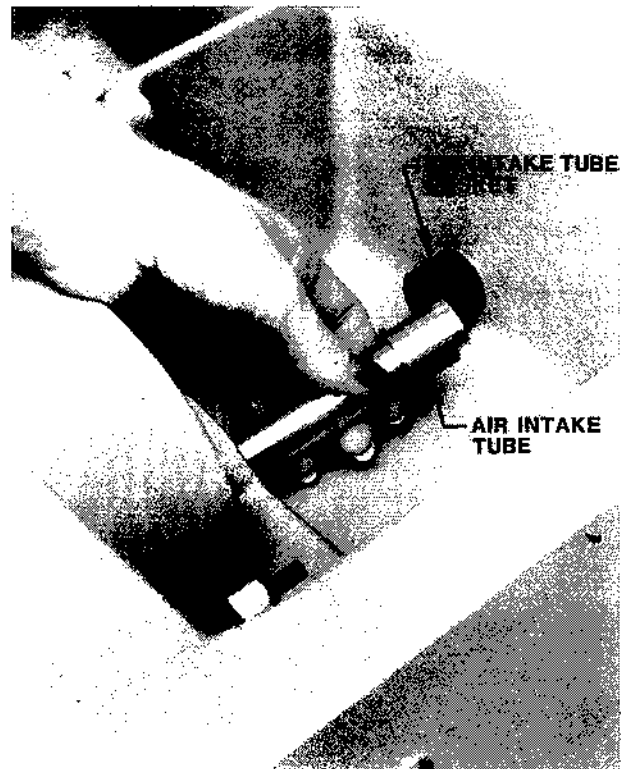


FIGURE 5.5 REMOVAL OF AIR INTAKE TUBE

- G. REMOVE DISPOSABLE ACCESS DOOR CUFF** from each Access Door Gasket by pulling it off from the outside; discard the cuffs.
- H. REMOVE ACCESS DOOR GASKET** from each Access Door hole by pulling it off from the outside.
- I. REMOVE TUBING ACCESS PORTS** from each side of the Hood by pulling them free.
- J. REMOVE DISPOSABLE IRIS ENTRY PORT SLEEVES** by pulling each Sleeve off the retainer rings; discard the sleeves.
- K. REMOVE THE AIR-INTAKE MICROFILTER COVER** by loosening the two thumbscrews.

5.2.2 CLEANING

CLEANING AGENTS. An iodophor or quaternary disinfectant-detergent registered by the U.S. Environmental Protection Agency should be used, but only after the Incubator is empty and disassembled as described in paragraph 5.2.1. A cleanser such as Air-Shields Kleen-aseptic® Germicidal Surface Cleanser may be used. When using any cleaning agent follow the manufacturer's directions for use. After removing all solid wastes and contaminants from the disassembled parts, clean them as follows:

SKIN PROBE. Use a disinfectant-detergent to thoroughly clean all surfaces, then dry with a clean cloth or paper towel.

HUMIDITY CHAMBER AND FILL PIPE, AIR INTAKE TUBE, ACCESS DOOR GASKETS, TUBING ACCESS PORTS, AND MAIN DECK GASKET. Fill the humidity chamber with a disinfectant-detergent, then remove the W-shaped Baffle from the chamber and dry it with a clean cloth or paper towel. Place the Air Intake Tube, Access Door Gaskets, Tubing Access Ports, and Main Deck Gasket into the solution.

NOTE: If necessary, a larger container may be used, but if the chamber is not used, then the Fill Pipe and Humidity Chamber must be cleaned separately.

Allow them to soak as recommended by the cleaning solution's manufacturer, then remove them and dry completely with a clean cloth or paper towel. Drain the Humidity Chamber, scrub it thoroughly including all indentations, then dry the chamber and Fill Pipe (inside and out) with a clean cloth or paper towel.

If necessary to remove the fill pipe for cleaning, rotate the Fill Pipe Assembly about 1/4 turn to the left. Loosen the thumbscrew that secures the Fill Pipe Bracket, and rotate the bracket 1/4 turn to the left. Unscrew the Fill Pipe Assembly by rotating counterclockwise as shown in Figure 5.6. Clean Fill Pipe Assembly and the sleeve that becomes a loose part when the Fill Pipe Assembly is unscrewed.

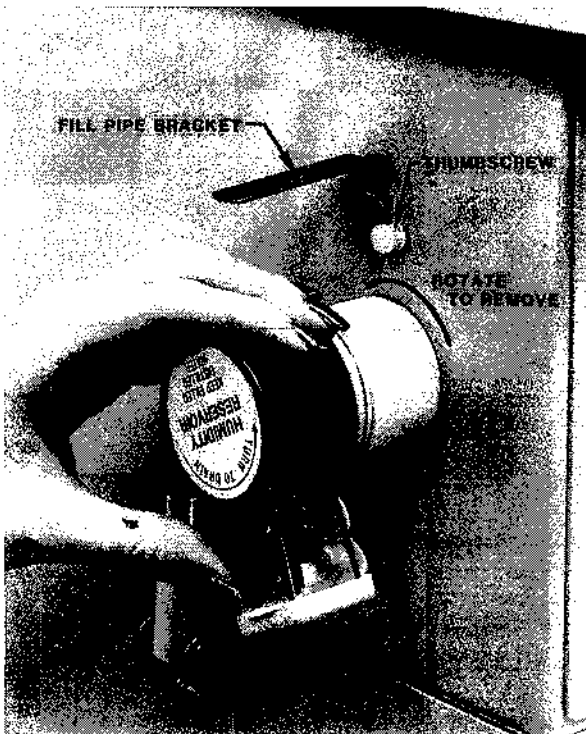


FIGURE 5.6 REMOVAL OF HUMIDITY FILL PIPE ASSEMBLY

*Model C100 only.

CONTROLLER. The portions of the Controller external to the controlled Incubator environment include the front panel and the top, bottom, and two sides of the chassis. These portions may be wiped clean with a cloth dampened with a disinfectant-detergent.

CAUTION: Some chemical cleaning agents may be conductive and/or leave a residue which may permit a build-up of dust or dirt which may be conductive. Do not permit cleaning agents to contact electrical components. Do not spray cleaning solutions onto any of these surfaces.

The portions of the Controller that are within the Incubator's controlled environment are on the rear surface; included are the air temperature probe, the fan impeller, the heater, the gaskets, and the surface of the Controller to which these components are mounted.

CAUTION: Failure to clean could result in sufficient lint buildup to reduce airflow, which will affect temperature control and cause high oxygen concentrations.

1. Remove any lint buildup; pay particular attention to the fan impeller, heater, air temperature probe, and air flow sensor.
2. Clean these surfaces with a disinfectant-detergent then dry with a clean cloth or paper towel.

NOTE: A disinfecting tank is available as an accessory from Air-Shields to facilitate cleaning the rear surface of the Controller. The Controller rear surface is immersed into the tank after filling it with a disinfectant-detergent, then allowed to soak as recommended by the manufacturer of the cleaning solution.

MATTRESS TRAY, AIR CURTAIN COVER, MAIN DECK. Use a disinfectant-detergent to clean all surfaces thoroughly, then dry with a clean cloth or a paper towel.

HOOD AND CABINET STAND. Use a disinfectant-detergent to clean all surfaces of the hood thoroughly, including the inner wall* and access door heat shield*. Make sure to clean all holes, indentations, baffles, etc., then dry with a clean cloth or paper towel.

CAUTION:

- Alcohol can cause crazing of the clear Plexiglas® Hood. Do not use alcohol for cleaning.
- Do not expose the hood assembly to direct radiation from germicidal lamps. Ultraviolet radiation from these sources can cause cracking of gaskets, fading of paint, and crazing of the clear Plexiglas® Hood.

AIR-INTAKE MICROFILTER. Do not attempt to clean or reverse the microfilter. If visibly dirty, or older than 3 months, it should be replaced. Before installing a new filter, clean the Microfilter chamber and cover with a disinfectant-detergent.

WARNING: A dirty Microfilter may affect oxygen concentration and/or cause carbon dioxide buildup. Be sure the filter is checked on a routine basis commensurate with local conditions.

5.2.3 REASSEMBLY AFTER CLEANING

After cleaning all parts and assemblies as described in paragraph 5.2.2, reassemble as described below.

- A. **INSTALL THE AIR INTAKE TUBE** (into the Base Assembly) by reversing the procedure shown in Figure 5.5.
- B. **INSERT HUMIDITY CHAMBER Baffle** into the Humidity Chamber.

C. **INSTALL THE MAIN DECK AND HOOD SEAT GASKET** into the Base Assembly as shown in Figure 5.7. Rotate the Main Deck Retainer (Figure 5.4) to secure the deck.

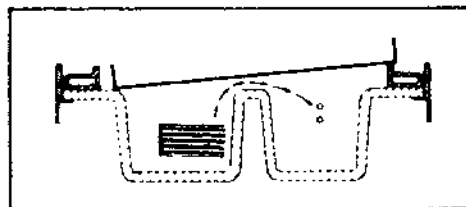
D. **INSTALL THE AIR CURTAIN COVER AND MATTRESS TRAY.**

WARNING: The Air Curtain Cover must be properly installed for correct temperature control.

Hook the lip on the bottom rear of the Air Curtain onto the rod at the rear of the Main Deck Assembly, then lower the cover toward the front of the Incubator to the rest position. Close the Hood Assembly and check for proper operation of the Air Curtain Cover. The Air Curtain Cover is operating correctly if it rises slightly when the Access Panel is opened. Install the Mattress Tray by positioning it a few inches above the mattress rails, then lowering straight down.

E. **INSTALL DISPOSABLE MATTRESS COVER.** Place a new disposable Mattress cover over the mattress, then place the mattress onto the tray.

WRONG MAIN DECK POSITION-Main deck placed up on gasket on one side, permitting air flow as shown by dashed line.



CORRECT MAIN DECK POSITION-Main deck placed down on conditioning chamber top.

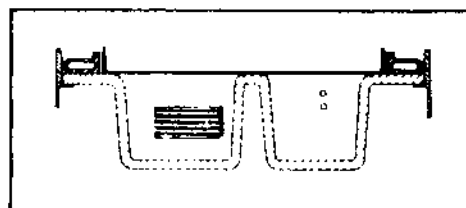
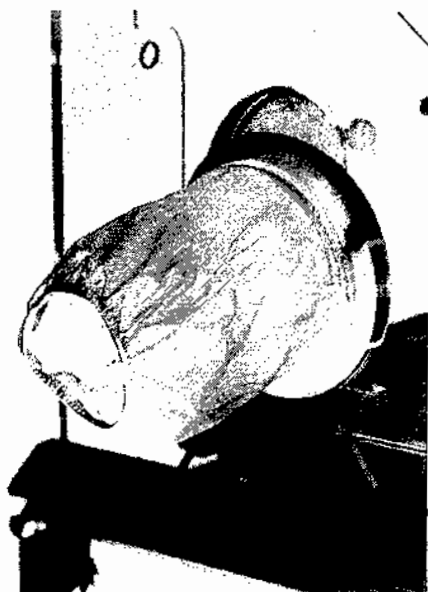


FIGURE 5.7 INSTALLATION OF MAIN DECK AND HOOD SEAT GASKET

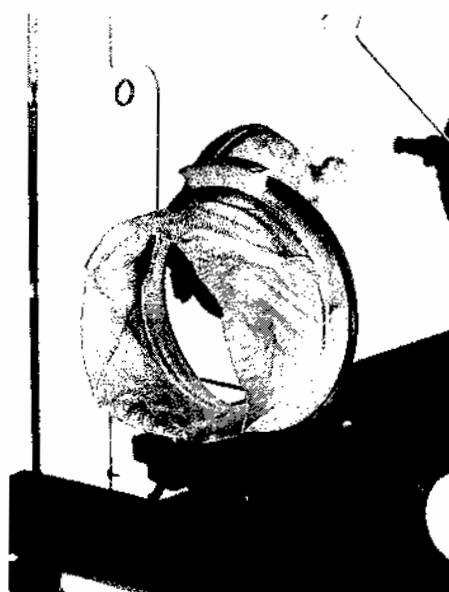
F. INSTALL DISPOSABLE IRIS ENTRY PORT SLEEVES.

Install a new Iris Entry Port Sleeve as shown in Figure 5.8

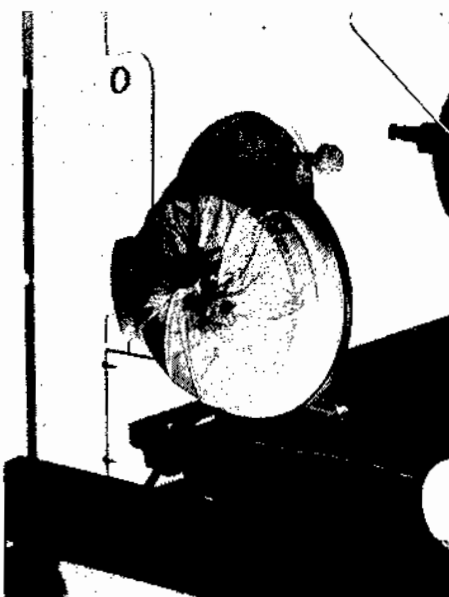
NOTE: If the Incubator is to be gas sterilized, wait until after sterilization to install new sleeves



- 1 Install the smaller diameter elastic band of a new sleeve over the inner ring of the port housing.



- 2 Fold back and slip larger elastic band over the outer ring of the port housing.



- 3 Rotate outer ring to close. If properly installed, the sleeve will open again if rotation is reversed.

FIGURE 5.8 INSTALLATION OF IRIS ENTRY PORT SLEEVE

G. INSTALL A TUBING ACCESS PORT into the front edge of each side of the Hood. Replace if distorted or torn.

H. INSTALL AN ACCESS DOOR GASKET behind each Access Door, as shown in Figure 5.9.

L. INSTALL A NEW AIR INTAKE MICROFILTER, if necessary. Replace the Air Intake Microfilter Cover and tighten the two thumbscrews. If a new filter is installed, indicate the date on the place provided on the cover.

IMPORTANT: A complete functional checkout (paragraph 4.2.1) should be performed before returning the unit to service.

5.3 GAS STERILIZATION

Prior to gas sterilization, the entire Incubator should be thoroughly cleaned as described elsewhere in this section. All used disposable elements such as iris sleeves, access door cuffs, mattress covers, etc., should be removed and discarded as described in the cleaning instructions. New disposable elements should be installed after sterilization.

Release the Controller latches and slide the unit out about 1/4". The Access Panel may be closed, but the Access Doors should be left open. The Air Intake Microfilter may be left in place.

CAUTION: Sterilization temperature should not exceed 130° F (54.5° C).

NOTE: Gas sterilization does not eliminate the need for routine replacement of the Air Intake Microfilter.

Standard Gas sterilization procedures as programmed by automatic equipment such as made by American Sterilizer and Wilmot Castle are satisfactory as these do not normally exceed 130° F (54.5° C).

Upon completion of gas sterilization, an aeration period of 16 to 24 hours should be allowed. The Controller should be properly secured in place and the Incubator should be operated in a dry condition for the entire period of aeration at a temperature of 32 to 35° C. After aeration, if the unit is not to be used immediately, a disposable dust cover should be placed on the Incubator.

IMPORTANT: A complete functional checkout procedure (paragraph 4.2.1) should be performed before returning the unit to service.

5.4 TROUBLESHOOTING

Troubleshooting for the operator of the Incubator is presented in Table 5.1. If the fault cannot be localized from the chart, the unit should be removed from use and servicing should be referred to factory trained or otherwise qualified personnel.

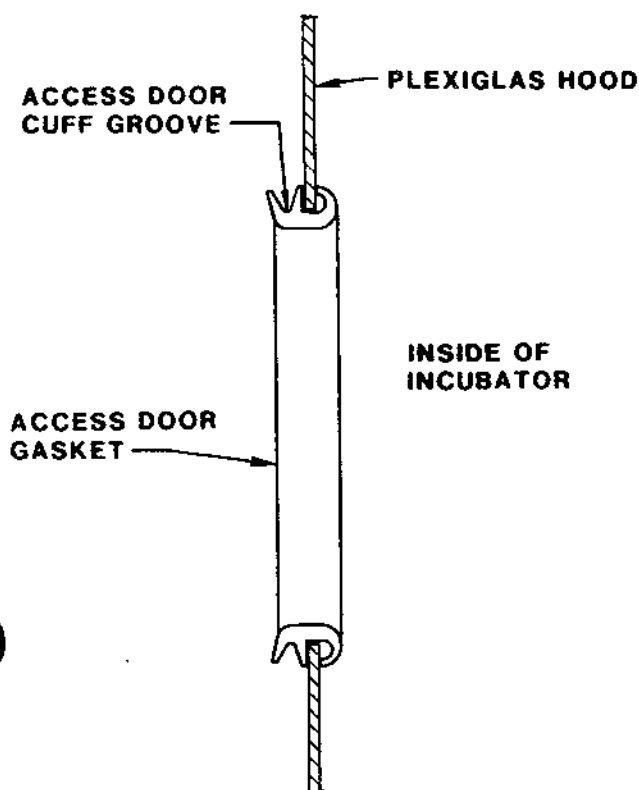


FIGURE 5.9 INSTALLATION OF ACCESS DOOR GASKET

I. INSTALL A NEW ACCESS DOOR CUFF onto each Access Door Gasket by stretching the larger diameter elastic band into the groove in the gasket. When installed correctly, the cuff has a small opening at its center. The Access Door should latch with slight pressure, and should open when the latch button is depressed.

NOTE: If the Incubator is to be gas sterilized, wait until after sterilization to install new sleeves.

***J. INSTALL HOOD INNER WALL** by reversing the procedure shown in Figure 5.2.

***K. INSTALL THE HEAT SHIELD** onto the Access Panel.

*Model C100 only.